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ABSTRACT

Class size is a complex problem that depends on many factors. The central theme which runs through the current research literature is that academic achievement does not necessarily improve with the reduction of student/teacher ratio unless appropriate learning styles and effective teaching styles are utilized. It is also evident that no single class size is best for all grade levels and all subject areas. However, based on recent research studies, there is considerable agreement that (1) smaller class sizes seem to result in higher achievement among students who are economically disadvantaged; (2) students with lower academic ability seem to do better in smaller classes; (3) class size may affect student attitudes more significantly than it affects achievement; (4) a direct effect of large class size is to lower the morale and increase the stress of teachers; and (5) there is typically little to be gained from reductions in class size that do not bring class size below 30. (RS)

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The Effects of Class Size on Reading Achievement

Sheree Goettler-Sopko

The issue of class size is a continuing concern. State legislatures, school administrators, teachers in in-service programs, and professional journals have continued debating and discussing this issue. The education reform movement and excellence in education movement has renewed the class size research. Widely publicized national studies give credence to the fact that teaching and learning are more effective when students are taught in smaller classes. This 'common sense' theory that small class size promotes achievement has not been supported by research.

Consequently, additional research with controlled variables, is needed to replicate previous studies. There is a need to know if small class size in the primary grades will enhance reading achievement. After all, children learn to read in the primary grades and then read to learn for their future. The current study would not only add to recent research on class size but would provide insight on first grade reading achievement -- small class vs. large class, taught by the same method of reading instruction and by the same teacher, over the course of a four year period. The results of this present study will hopefully be of value to teachers, administrators, school boards and parents.

The issue of class size still remains a continuing debate between researchers and practitioners. Some parents elect to send their children to private schools because of the smaller class size which they believe will allow for more individual attention. Most teachers will enumerate the benefits to both teachers and students of smaller classes.

Besides the logical belief that smaller classes will influence the teaching/learning process in positive ways, other related issues are the emotional needs of the students; positive attitudes and behavior; teacher morale; achievement of disadvantaged or low ability; and classroom environment.

The relationship of class size and student achievement has been historically studied since the beginning of the century. J.M. Rice is credited with conducting the first study on educational processes and their effects on student achievement, first published in *The Forum* in 1902. This study contained virtually no numbers and Rice observed no strong relationships between class size and attainment. Since the early study, voluminous research studies have been reported.

The first meta-analyses research on class size was published by Gene Glass and Mary Lee Smith (Sept. 1978). By combining 77

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studies, Glass and Smith were able to show 725 comparisons of achievement in classes of different sizes. The most startling outcome of the meta-analysis was the findings that the greatest gains in achievement occurred among students who were taught in classes of 15 students or less. In classes of 20 to 40 students, class size had a less dramatic effect on students' achievement.

Glass and Smith categorized the four stages of research on class size as follows:

1895 - 1920 = the pre-experimental era
1920 - 1940 = the primitive experimental era
1950 - 1970 = the large-group technology era
1970 - present = the individualization era

Older studies showed few or no effects; newer studies show generally positive effects.

Most teachers clearly believe that class size radically affects the quality of their work life. Unfortunately, researchers are fast to point out in order to maximize each child's learning potential, classes must be so small that few schools can afford to staff and house them (Glass, Smith 1978).

However, in 1979, Glass and Smith arrived at a very different conclusion from their 1978 report. They found that teachers and students strongly preferred classes of 20 students or less. But teachers appreciated a reduction in class size from 40 to 38 students almost as much as they appreciated a reduction of two students when they were working with much smaller classes. Thus, Glass and Smith came to prove a substantial reduction in class size -- to about 15 students -- would be likely to yield higher levels of achievement.

Some researchers and practitioners believe that smaller classes in grades K-3 could be a key factor in improving U.S. education. But reformers cannot seriously consider the reduction of class size in the early grades because thus far, there is no conclusive evidence to convince funding agencies that smaller classes would be a highly productive use of their funds. Also, the public schools lack the money to pay for the additional teachers, space, materials, and other expenses that smaller classes would necessitate.

Even so, researchers continue their quest to prove some conclusive evidence on class size. A very popular study on the percentage of Selective Service draft candidates who failed the mental test in 1969 and 1970 in all 50 states were compared with nine socio-economic and educational variables (Walberg, Rasher 1974). The results of this comprehensive study showed that "high pupil-teacher ratios are associated with high rates of test failures."

However, Porwoll's (1978) comprehensive review of literature

on class size and achievement was found to be inconclusive, contradictory, and complex. His findings included: no research provides clear-cut guidelines for an "optimum" class size covering all types of students at all grade levels; existing research findings do not support the contention that smaller classes will of themselves result in greater academic gains for pupils. But Porwoll did conclude that there is research evidence that small classes are important to increase pupil achievement in reading and mathematics in the early primary grades and for economically or socially disadvantaged pupils.

Cotton and Savard's (1980) data supported Porwoll's conclusion that there is no optimal class size for all instructional situations. "Reducing class size will not automatically produce any particular, foreseeable effect on achievement, but smaller class size has the potential for stimulating the development and use of improved instructional methods, but will not automatically do so." Small classes and large classes were inconsistently defined in this study, however, the research indicates that small classes can be beneficial in certain situations: achievement of disadvantages, low ability, special education or primary age students are enhanced by smaller classes.

From 1969 to 1979, Wallbert, Schiller and Haertel (1982) assembled a collection of research reviews on instruction and related research on learning, conducted in elementary, secondary, and higher education schools. The research showed that 60 percent of 691 comparisons found that students in smaller classes achieved at a higher rate. Also in agreement with this study was Doso and Holley (1982). Title I and local funds were used to establish a schoolwide project in Austin, Texas. Pupil/teacher ratios were lowered to 15-1 in controlled groups and tested using the Iowa Tests of Basic Skills against classes with 25-1 ratios. Evaluation findings revealed that: the lower pupil-teacher ratio seems to improve achievement meaningfully in all basic skill areas. The project teachers had very high morales and felt more effective in their work. There was less off-task time, better teacher monitoring of work, earlier corrective feedback and fewer disruptions. Doso and Holley also revealed that lowering the pupil-teacher ratio from 25-1 to 15-1 would increase personnel costs by 67% in the schools and adequate classroom space could also be a problem.

A renewed interest in research on the effects of class size has become a part of the education reform movement. Bain and Achilles (1986) reported on researchers in Chicago studying government-funded kindergarten classes in more than 100 schools, most of which served low-income families. The classes varied in size and in duration (full day or half day). The researchers found that the strongest influence in kindergarten achievement appeared to be small class size with ratios of 16:1. These children achieved at or above national norms on a standardized achievement test, even when those classrooms provided only half-

day instruction. However, when comparing full-day with half-day and ratios were both 16-1, students attending full-day programs performed best.

Bain and Achilles (1986) also reported on a study conducted for an Indiana school system -- Project Prime Time. This study compared the achievement of first-graders in small classes (18 students) with that of first-graders in larger classes (22 students). According to the final report, the findings provided "overwhelming evidence of the gains in scores for students in the 1984-85 small size classes as compared to the larger classes of the 1983-84 school year.

In 1984, the Tennessee legislature passed the Comprehensive Education Reform Act (CERA). One of the components of the program was to include a study of the effects of pupil-teacher ratio 15:1 on students in grades 1-3. The study began in August 1984 and continued for three years. Pupil achievement was the major focus of the study, but teachers of the experimental classes provided valuable information. Entries in their logs suggested that a class size of 15 has a positive effect both on the teaching process and on student behavior.

To assess quantitative differences, the researchers compared the performance of the experimental groups with that of the control groups and with that of Nashville first-graders as a whole. A comparison of pre- and post-test scores in reading and mathematics on the California Achievement Test, showed statistically significant gains ($p < .01$) favoring students in the experimental groups. Because of this study, the Tennessee legislature appropriated $3 million to be used for a major statewide study of class size for the next four years -- Student-Teacher Achievement Ratio Project (STAR). This will try to determine the benefits for K-3 students in small classes of 13-17, regular classes 22-25, without a teacher's aide and a regular class 22-25 with a teacher's aide (Schultz, 1989).

In kindergarten, students in small classes scored six points higher in reading and eight points higher in math on standardized achievement tests than those in the regular-sized classes; they had a slightly higher pass rate on the basic skills test. By the end of 1st grade, the small-class achievement gap widened to 11 points in reading and 12 points in math on the SAT -- a difference that experts agreed is "large and educationally important, not just statistically significant." By the end of 1st grade, the regular classes with a teacher's aide were only slightly ahead of the regular classes without an aide. Results on 2nd graders' performance (released Nov. 1989), showed that students in small classes have maintained their academic gains. Data from 3rd grade are being analyzed and are expected to be released in 1990.

One truly remarkable aspect of the project is that the initial findings have been quickly translated into policy.

Because of this, $2.8 million of state money and $1.3 million in federal Chapter I funds would be pumped into 44 elementary schools to reduce class size.

Project STAR's initial conclusions come less than two years after a U.S. Education Department report asserted that reducing class size is "the most costly and most primitive" method of enhancing student achievement (Schultz, 1989).

The 44-page review of literature, pointed out that from 1961 to 1986, the median class size in elementary schools dropped from 30 to 24 students. But over the same two decades, the document stated, student achievement -- as measured by standardized test scores -- also showed a steady decline.

Still the Tennessee study and the U.S. Education Department analysis are not totally in conflict. Both did acknowledge that class sizes would have to drop sharply below their current levels -- to no more than 15 students each -- before researchers would see significant improvements in student achievement.

Although the Department of Education declared that smaller classes don't really make for better education, Edmund Janko (1989) an english teacher at Bayside High School, Bayside, New York, holds onto the "common sense" theory that small class size promotes achievement. Janko states students, who would otherwise fall through the cracks, learned to think, have opinions and express them. Janko had the opportunity to teach a small class of high school "off track" english students (12 pupils) by a computer error (the number of students selected for his class). And as most teachers would agree, Janko felt it was one of the most satisfying teaching experiences of his career.

Class size is a complex problem that depends on many factors. The central theme which runs through the current research literature is that academic achievement does not necessarily improve with the reduction of student/teacher ratio unless appropriate learning styles and effective teaching styles are utilized. It is also evident that no single class size is best for all grade levels and all subject areas. However, based on current research studies, there is considerable agreement that:

-- Smaller class size seems to result in higher achievement among students who are economically disadvantaged.

-- Students with lower academic ability seem to do better in smaller classes.

-- It may be that class size affects student attitudes more significantly than it affects achievement.

-- A direct effect of large class size is to lower

the morale and increase the stress of teachers.

-- There is typically little to be gained from reductions in class size that do not bring class size below 30.

Clearly, the excellence in education movement has fostered the renewed interest in the issue of class size. Several states and local school systems are studying reductions in class size as a means of achieving educational excellence. Many believe larger expenditures in the early grades pay off later in fewer dropouts, fewer retentions, and better-prepared entrants to the work force.

In conclusion, merely reducing class size is no guarantee of increased pupil achievement in the smaller class. What does seem to happen (naturally, in not every case), according to the research studies, is that a reduction in class size causes teachers to adjust accordingly and modify the teaching process to a more individualistic and humanistic approach ... "The research supports the hypothesis that small classes are superior to large classes in producing more desirable teaching practices." (Lindbloom, 1970.)

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